Clin Orthop Relat Res (2009) 467:605–607
DOI 10.1007/s11999-008-0671-z

SYMPOSIUM: FEMOROACETABULAR IMPINGEMENT: CURRENT STATUS OF DIAGNOSIS AND TREATMENT

Femoroacetabular Impingement: Current Status of Diagnosis and Treatment

Marius Nygaard Smith-Petersen, 1886–1953

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Published online: 9 January 2009

Abstract This biographical sketch of M. N. Smith-Petersen corresponds to the historic text, The Classic: Treatment of Malum Coxae Senilis, Old Slipped Upper Femoral Epiphysis, Intrapelvic Protrusion of the Acetabulum, and Coxa Plana by Means of Acetabuloplasty, available at DOI 10.1007/s11999-008-0670-0.

Marius Nygaard Smith-Petersen was born in 1886 of a merchant marine family on the coastal town of Grimstad, southwest of Oslo, Norway [1, 17]. In brief, he emigrated with his mother to Milwaukee in 1903, completing high school there in 1906. He attended the University of Chicago and graduated from the University of Wisconsin. Smith-Petersen then moved to Boston where he lived the rest of his life: medical school at Harvard College, internship at the Peter Bent Brigham Hospital, and further training at the Massachusetts General hospital, his base until his death in 1953 (an event noted with sadness internationally [1, 6–8, 11]).

Smith-Peterson was among the most prominent [17] and innovative of orthopaedic surgeons of the first half of the 20th century. (Readers are directed to his works on a new approach to treating fractures of the neck of the femur [15], mould arthroplasty [14], osteotomy of the spine [16], and continuous irrigation for osteomyelitis [17], all republished as Classics in CORR as examples of his innovative spirit.) In this issue of CORR, we republish yet another of his innovations related to this month's symposium on femoroacetabular impingement. Smith-Petersen was perhaps the first to recognize and describe in detail an approach to treating impingement [13]:

> In February 1935 a patient, aged 55, was admitted to the Orthopaedic Ward of the Massachusetts General Hospital with a diagnosis of "bilateral intrapelvic protrusion of the acetabulum". The case was discussed on ward rounds and the general opinion was that nothing could be done for this patient, and that she would have to adapt her life to the hip-joint condition. This did not seem a constructive attitude, and the patient was allowed to stay on the ward in the hope that some operative procedure might be developed which would give her relief from her pain.
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> The question to be answered was this: "What was the source of this patient's pain?" The answer was: "The impingement of the femoral neck on the anterior acetabular margin". Such impingement would result in "traumatic arthritis" with characteristic changes of the joint surfaces as well as the synovia. Since the joint surfaces have no nerve endings, their function in itself cannot be the source of the pain; as they slide over one another, even though the hyaline cartilage is markedly thinned, they will not give rise to symptoms. What does give rise to pain? The impingement of two surfaces—one covered by synovial, the other by cartilage—will give rise to congestion of the synovia, synovitis, and, because of the periosteal irritation, hypertrophic changes.

Smith-Petersen recognized in this case impingement could be relieved either on the acetabular or femoral side.

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He chose the former in his first case: "To eliminate the impingement by a plastic procedure on the neck of the femur would be impossible, since this would sacrifice too large a portion of the neck." Therefore he advocated removing the anterosuperior portion of the acetabular rim. He concluded it important to also remove a portion of the anterosuperior capsule since that would remove a source of innervated tissue causing symptoms. However, he also identified situations where the problem existed on the femoral side: "If the anterior femoral head and neck are very prominent, it may at times be advisable to do a plastic operation on these as well as the acetabulum" and "…when they have been the seat of advance proliferative changes." He emphasized the importance of checking the range of motion intraoperatively to ensure correction of the impingement. Smith-Petersen had performed the procedures in 11 patients: "They have all done well; the relief from pain is the outstanding feature; gain in motion is definite but not marked." He recognized impingement could arise from a number of sources (as implied in the title of our republished article), and emphasized, "The surgeon must be radical in performing this plastic procedure, but he must not remove so much of the superior aspect of the acetabulum as to allow the head of the femur to become displaced anteriorly." As always, Smith-Petersen advised caution, "Sufficient time has not elapsed to obtain true end results, but the author feels justified in rendering this preliminary report because the method is non-destructive and seems effective in relieving pain in conditions for which there is no other adequate treatment."

Heyman, Herndon, and Strong [4], in 1957, reported 20 patients (21 hips), ages 12 to 16, with slipped capital femoral epiphysis in whom they recognized impingement. Their first operation was performed in 1935, the same year as that of Smith-Petersen, but their next case, which they described in detail, was not performed until 1942. At the time of surgery they noted, "The obstruction to motion was identified as a large bony prominence at the anterosuperior aspect of the neck of the femur at its junction with the displaced epiphysis, which was seen to impinge against the rim of the acetabulum." Rather than performing the planned cervical osteotomy, they chose the more conservative approach of removing the prominence, after which "The patient's hip could then be moved freely in all ranges, except for some limitation of abduction." At the time of their report, 14 of the 20 patients had followup of 2 to 14 years. While these patients were functioning well, they also cautioned readers: "A true end result cannot really be before middle age, for it cannot be determined before then if the hips treated by this conservative operative method will stand up under the stresses and strains of years of physically active life."

Herndon and his colleagues acknowledged they were not the first to try this approach, although they had been unaware of the brief earlier descriptions. Whitman, in 1909, had performed this sort of operation rather than an osteotomy in one out of 11 patients with coxa vara [20]. A few years later, Vulpius and Stöffel had a brief reference to a procedure on the femoral neck in 1913 [18].

Thus, the concepts of impingement and the principles of treatment are nearly a century old, if largely forgotten in the latter part of the 20th century. Ganz and his colleagues from Bern reintroduced these ideas in the 1990s in a series of papers reporting impingement in various conditions [2, 9, 10, 12]. They have refined the concepts [5] and proposed many patients with previously undiagnosed hip pain had more or less subtle deformities of the anterior femoral neck causing impingement and early osteoarthritis [3, 19]. This symposium includes a variety of papers addressing the concepts, the diagnosis, and the treatment of femoroacetabular impingement. We should, however, recall the words of caution of Smith-Petersen and Heyman and colleagues. While current procedures clearly relieve pain and restore function and to a lesser degree restore motion in large portion of patients, we do not know whether these procedures will delay the development of osteoarthrosis in middle age and beyond.

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